

WE CLAIM:

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1. An illuminated display device, comprising:
a first light source directing light generally along a first axis;
a reflective image display unit disposed with an optical axis
substantially parallel to the first axis; and
a reflective polarizing film disposed to direct light from the first light
source to the reflective image light display unit.
2. A device as recited in claim 1, wherein the reflective polarizing film
is curved in at least one dimension.
3. A device as recited in claim 2, wherein the optical axis of the
reflective image display unit is laterally displaced from the first axis in a
displacement direction and the reflective polarizing film is curved with a radius of
curvature lying parallel to a plane formed by the first axis and the displacement
direction.
4. A device as recited in claim 2, wherein the optical axis of the
reflective image display unit is laterally displaced from the first axis in a
displacement direction and the reflective polarizing film is curved with a radius of
curvature lying parallel to a plane formed by the first axis and an axis orthogonal
to both the first axis and the displacement direction.
5. A device as recited in claim 2, wherein the optical axis of the
reflective image display unit is laterally displaced from the first axis in a
displacement direction and the reflective polarizing film is curved with a first
radius of curvature lying parallel to a plane formed by the first axis and the
displacement direction and is curved with a second radius of curvature lying
parallel to a plane formed by the first axis and an axis orthogonal to both the first
axis and the displacement direction.

Sub A²

6. A device as recited in claim 2, wherein a first portion of the reflective polarizing film is displaced from the first light source along the first axis and a second portion of the reflective polarizing film is displaced from the first light source along the optical axis

5 7. A device as recited in claim 6, wherein the first portion of the reflective polarizing film is curved.

Sub C²

8. A device as recited in claim 6, wherein the second portion of the reflective polarizing film is curved.

10 9. A device as recited in claim 6, wherein both the first and second portions of the reflective polarizing film are curved.

10 10. A device as recited in claim 1, wherein the display system further includes a viewing port for a user to view an image formed by the reflective image display unit, and the reflective polarizing film is disposed between the reflective image display unit and the viewing port.

15 11. A device as recited in claim 1, further comprising a clean up polarizer disposed to polarize light transmitted through the reflective polarizer from the reflective image display unit.

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20 12. A device as recited in claim 1, further comprising a reflector disposed to direct light from the first light source to the reflective polarizing film layer.

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13. A device as recited in claim 12, wherein at least one of the reflector and the reflective polarizing film is curved in at least one dimension to form a curved reflector.

5 14. A device as recited in claim 13, wherein the optical axis of the reflective image display unit is laterally displaced from the first axis in a displacement direction and the reflective polarizing film is curved with a radius of curvature lying parallel to a plane formed by the first axis and the displacement direction.

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and
10 15. A device as recited in claim 13, wherein the optical axis of the reflective image display unit is laterally displaced from the first axis in a displacement direction and the reflective polarizing film is curved with a radius of curvature lying parallel to a plane formed by the first axis and an axis orthogonal to both the first axis and the displacement direction.

15 16. A device as recited in claim 13, wherein the optical axis of the reflective image display unit is laterally displaced from the first axis in a displacement direction and the reflective polarizing film is curved with a radius of curvature lying parallel to a plane formed by the first axis and the displacement direction and is curved with another radius of curvature lying parallel to a plane formed by the first axis and an axis orthogonal to both the first axis and the displacement direction.

20 17. A device as recited in claim 1, wherein the first light source includes a light emitter to emit light, a diffuser to emit the light emitted by the light emitter and a pre-polarizer to polarize light diffused by the diffuser, the light polarized by the diffuser being directed to the reflective image display unit.

18. A device as recited in claim 17, wherein the first light source further includes a reflector disposed to direct light from the light emitter to the reflective polarizing film.

25 19. A device as recited in claim 17, wherein the light emitted by the light emitter is directed to the reflective image display unit by at least two reflecting surfaces, the reflective polarizing film forming a final reflecting surface closest to

the reflective image display unit along an optical path between the light emitter to the reflective image display unit.

20. A device as recited in claim 19, wherein the pre-polarizer is disposed along the optical path between the final reflecting surface and a previous reflecting surface.

21. A device as recited in claim 20, wherein the diffuser is disposed along the optical path between the pre-polarizer and the previous reflecting surface.

22. A device as recited in claim 19, further comprising a light guide disposed between the light emitter and the pre-polarizer, the light guide having an output end to transmit light out of the light guide to the pre-polarizer.

23. A device as recited in claim 22, wherein the diffuser includes the light guide.

24. A device as recited in claim 19, further comprising a light guide coupled to receive light from the light emitter, the light guide having a rear surface and an output surface, the rear surface being provided with light extraction features to direct light propagating within the light guide out through output surface towards the pre-polarizer.

25. A device as recited in claim 24, wherein the diffuser includes the light guide.

26. A device as recited in claim 17, wherein the light emitter includes a set of light emitting diodes, the set emitting light at at least three different wavelengths.

27. A device as recited in claim 1, further comprising a second light source disposed to direct light to the reflective image display unit by reflection off the reflective polarizing film.

28. An illuminated display device, comprising:

5 light generating means for emitting diffuse, polarized light along a first direction;

reflective display means for modulating reflected light with an image, the reflective display means having an optical axis substantially parallel to the first axis; and

10 reflective polarizing means disposed to direct the diffuse, polarized light from the light generating means to the reflective display means.

29. An optical system, comprising:

a display device including

15 a first light source directing light generally along a first axis;

a reflective image display unit disposed with an optical axis substantially parallel to the first axis; and

20 a reflective polarizing film disposed to direct light from the first light source to the reflective image light display unit;

a controller coupled to the reflective image display unit to control the image formed by the reflective image display unit; and

25 viewing optics to transport the image formed by the reflective display unit to a user.

30. A system as recited in claim 29, wherein the reflective polarizing film is disposed between the reflective image display unit to separate light incident on reflective image display unit from light reflected by the reflective image display unit.

31. A device as recited in claim 29, further comprising a clean up polarizer disposed to polarize light transmitted through the reflective polarizer from the reflective image display unit.

5 32. A system as recited in claim 29, further comprising a camera unit coupled to the controller, wherein the controller is configured to control the reflective image display unit to display an image corresponding to an object image received by the camera.

10 33. A system as recited in claim 32, wherein the camera unit is a video camera.

15 34. A system as recited in claim 32, wherein the camera unit is a digital camera.

35. A system as recited in claim 29, further comprising a computer coupled to the controller to display information generated by the computer.

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